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CITRUS PRODUCTION AND MARKET ASSESSMENT REPORT

LEBANON INDUSTRY VALUE CHAIN DEVELOPMENT (LIVCD) PROJECT

MARCH 2013

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CITRUS VALUE CHAIN ASSESSMENT REPORT

LEBANON INDUSTRY VALUE CHAIN DEVELOPMENT (LIVCD) PROJECT

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1. OBJECTIVES

This paper presents an in-depth analysis of international and domestic citrus end markets, as well as an overview of citrus production in Lebanon. The purpose of the paper is to present preliminary findings as to the key constraints and opportunities presented in the citrus value chain, to inform the LIVCD Project if it has the scope to work in citrus in the future.

Specifically, the study will present key market trends pertaining to the value and volume of Lebanese citrus trade, and citrus trade in key international end markets. It will also present key parameters of Lebanese citrus production such as classification of citrus producers in terms of scale and geography, production technology, and costs and profitability of production. Finally, the assessment will present several key opportunities and constraints for the expansion and upgrading of Lebanese citrus production.

2. OVERVIEW

Overall citrus production in Lebanon has declined by over 45 percent since 2007. The majority of Lebanese citrus producers are considered "small-scale", They are located in the coastal regions of the North and South of Lebanon. In addition to cultivating citrus, these farmers typically engage in other forms of agriculture, or have part time jobs in other sectors. Lebanese citrus producers grow popular varieties of citrus such as Shamouti and Navel oranges among others, but often traditional production practices reduce the quality of these fruits and overall yields. As new coastal crops such as bananas and avocado are seen as more profitable and promising, farmers have been replacing citrus orchards with these crops at high rates such that the amount of land planted with citrus is shrinking rapidly.

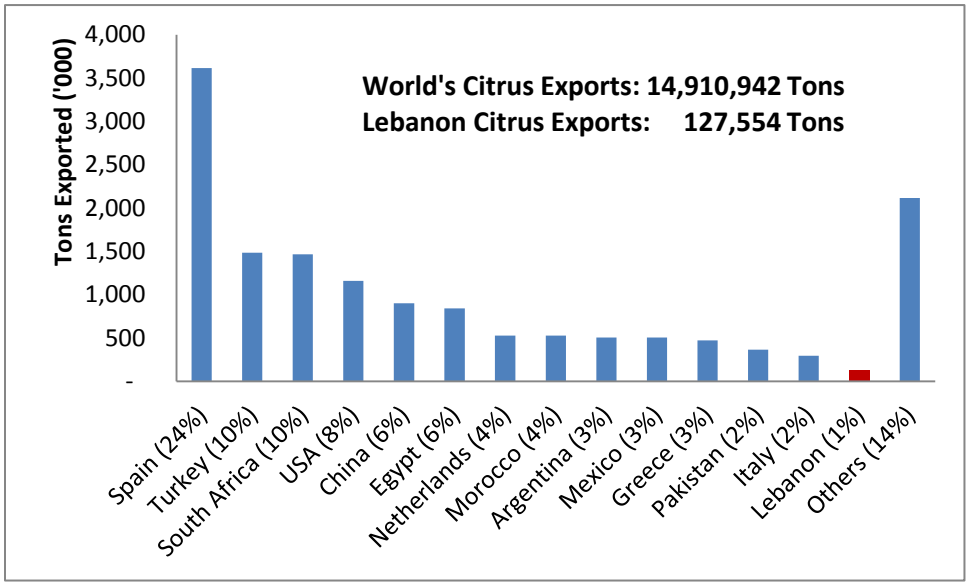
Opportunities to upgrade the citrus value chain include improving market intelligence on key export markets in terms of seasonality and pricing, upgrading production practices, investing in improved post-harvest practices, organizing citrus producers and making key improvements in the regulatory environment, and supporting expanded end markets for lower-quality oranges such as juice processing. Although these interventions could have substantial impact on the citrus value chain and farm-level profitability, interventions have to confront the current trend of farmers transitioning away from citrus production in favor of other crops.

3. LEBANESE CITRUS TRADE ANALYSIS

WORLD'S MAJOR CITRUS EXPORTERS

Citrus fruits are produced all over the world, and in 2011, over $12 billion of citrus was traded in international markets. Figure 1 below presents the largest exporters of citrus by volume in 2011. As seen in the figure, Spain is the largest exporter of citrus, with a market share of 24 percent of the total exported value, followed by Turkey (10 percent), South Africa (10 percent), and USA (8 percent). Lebanon claims a market share of just 1 percent, which is considerable given its small size.

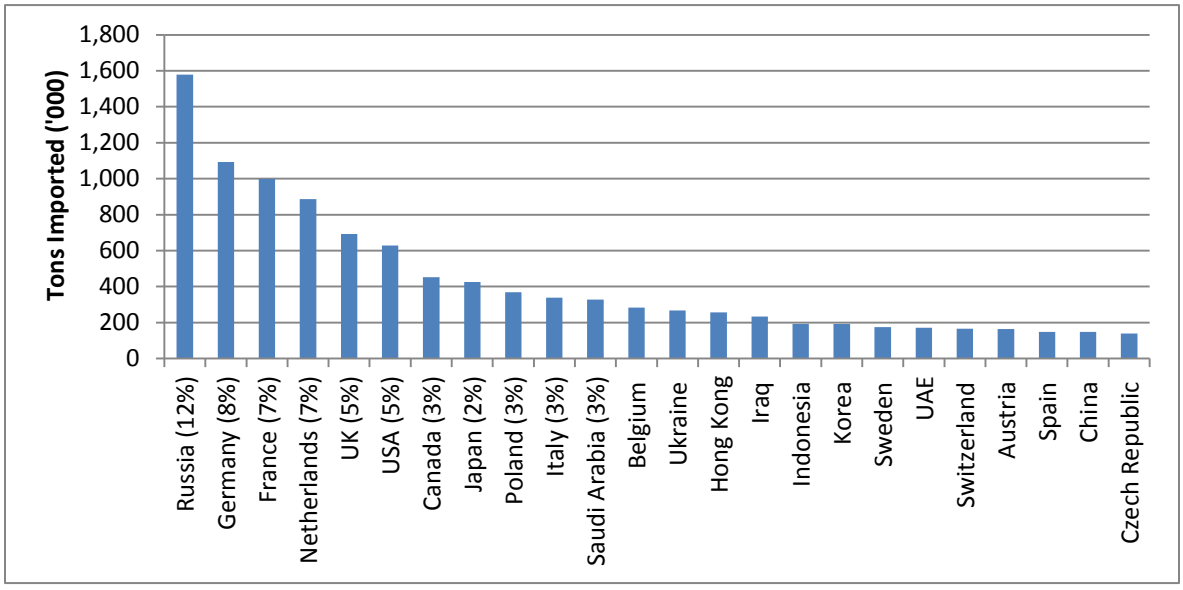
FIGURE 1: LARGEST WORLD EXPORTERS OF CITRUS, 2011



Source: Trademap

The largest world citrus importers are presented below in Figure 2. As seen in this figure, citrus fruits imports are divided between many importing countries that each claim relatively small market shares. The largest 4 importers represent just 34 percent of the citrus market, and the remaining 66 percent is divided among many importers, each claiming below five percent market share with a mode market share of less than 1 percent. This suggests that there could be many niche markets for lower volume citrus imports that Lebanon could access.

FIGURE 2: LARGEST WORLD IMPORTERS OF CITRUS BY VOLUME, 2011



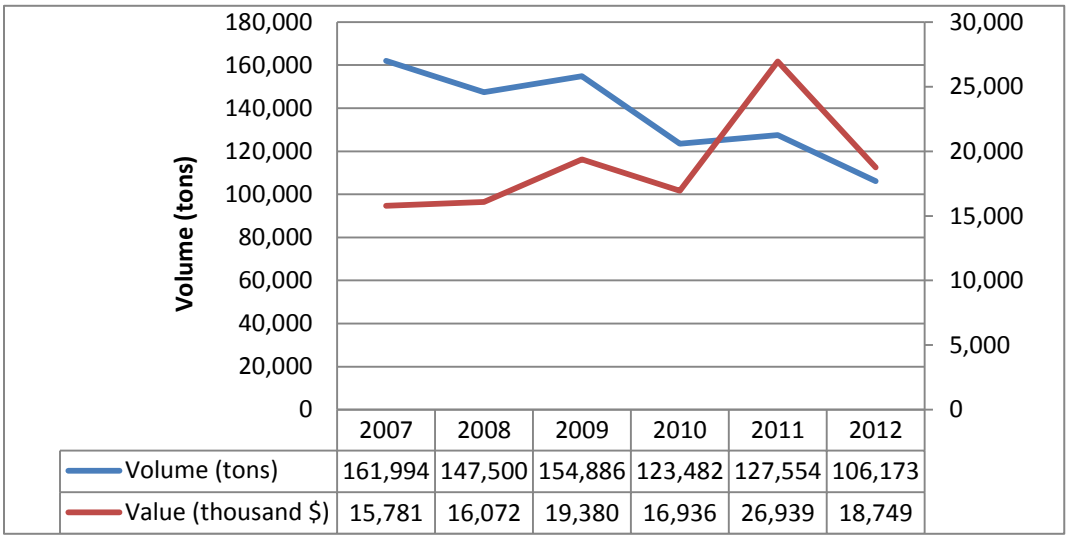
Source: Comtrade

LEBANESE CITRUS TRADE

Lebanon exports approximately 128,000 tons of citrus annually, for a total value of approximately $25.6 million as shown in Figure 3, volumes of citrus exports have dropped significantly by 34 percent since

2007, while total values have increased by 19 percent. Egypt is traditionally a very large supplier of citrus to the Middle East, and the price spike of Lebanese citrus between 2010 and 2011 is in large part due to a dramatic decline of Egyptian citrus exports to the Middle East caused by a period of instability in Egypt. Figure 4 presents this phenomenon in greater detail, and shows how as the value of Egyptian exports plummeted (because of a decrease in volume), the total value of Lebanese exports increased (because of decreased total supply of citrus and increased price). Although the repercussion of the political situation in Egypt has been a boon for Lebanese citrus producers, as the situation in Egypt becomes more stable, Egyptian oranges will come back online and Egyptian oranges will likely recover to previous export volumes restoring prices to their normal levels.

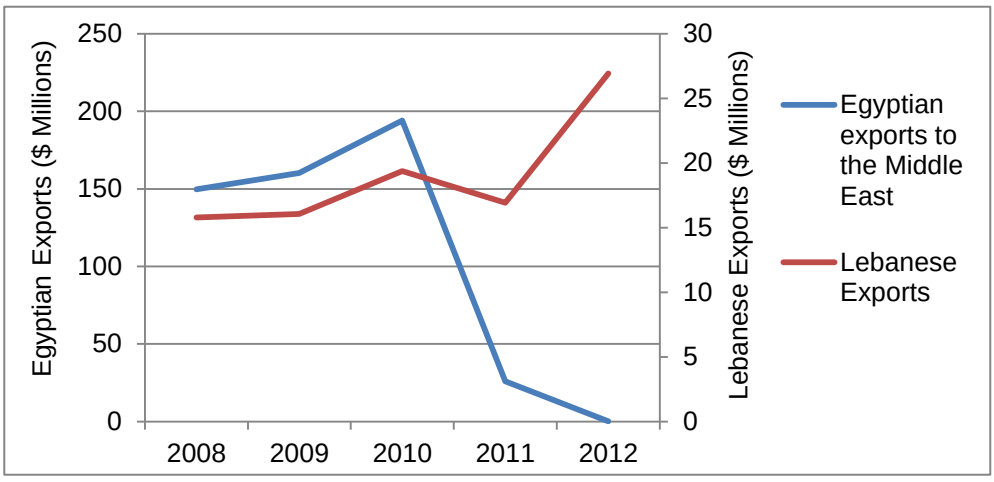
FIGURE 3: LEBANESE EXPORTS OF CITRUS FROM 2007-2012



	2007	2008	2009	2010	2011	2012
Volume (tons)	161,994	147,500	154,886	123,482	127,554	106,173
Value (thousand $)	15,781	16,072	19,380	16,936	26,939	18,749

Source: Comtrade

FIGURE 4: VALUE OF LEBANESE AND EGYPTIAN EXPORTS TO THE MIDDLE EAST

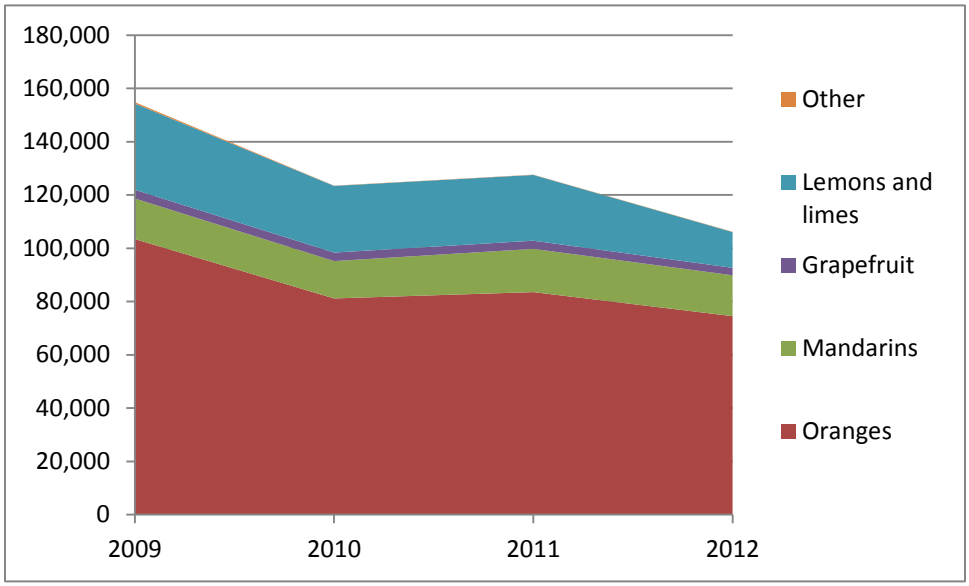


Source: Comtrade

As presented in Figure 5, oranges are the main exported citrus fruit of Lebanon. In 2012, Lebanon exported just under 75,000 tons of oranges, down from over 100,000 tons in 2009; this was equivalent to approximately 70 percent of total citrus exports. Exports of lemons and limes have also registered a

decline, down from 32,000 tons in 2009 to 13,000 tons in 2012. Exports of mandarin oranges have remained fairly constant at between 14,000 and 16,000 tons, and exports of grapefruits and other types of citrus are very small.

FIGURE 5: VOLUME OF LEBANESE CITRUS EXPORTS BY TYPE, 2009-2012

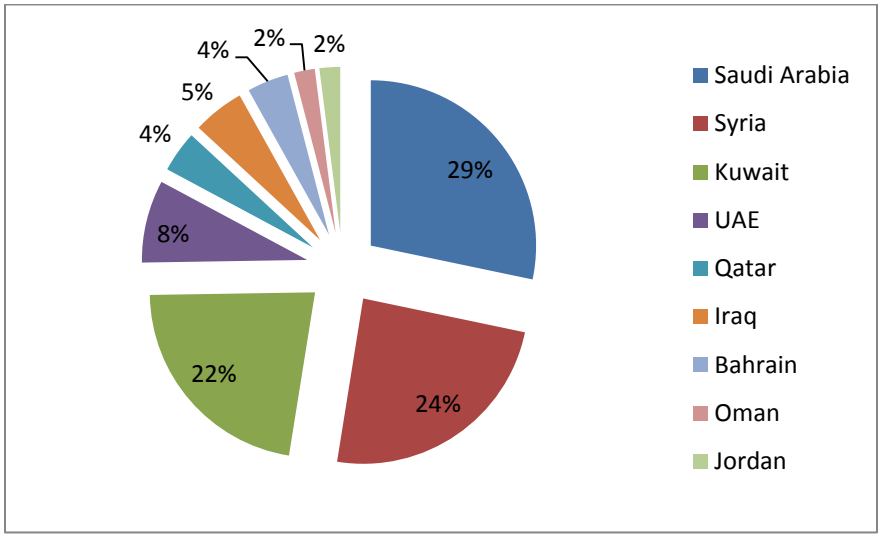


Note: Mandarins (including tangerines and satsumas); clementines, wilkings and similar citrus hybrids; Grapefruit, including pomelos; Lemons (Citrus limon, Citrus limonum) and limes (Citrus aurantifolia, Citrus latifolia)
Source: Lebanese Customs

CITRUS TRADE PARTNERS

Historically, Lebanon has sent the majority of fresh fruit and vegetable exports, including citrus, to Arab markets. As shown in Figure 6 below, in 2011 Lebanon exported over 99 percent of citrus by value to Arab countries, including 65 percent to GCC countries. Saudi Arabia is currently the largest destination market, importing 29 percent of Lebanese citrus exports, followed by Syria, which imported about 24 percent, and Kuwait with about 22 percent. Traditionally, Syria was the largest importer of Lebanese citrus. For example, in 2009, Syria imported 30 percent of total Lebanese citrus exports compared to Saudi Arabia, which imported only 21 percent. Due to the Syrian crisis, its import of Lebanese citrus steadily declined, and in 2012 Syria imported only 18 percent of total exports.

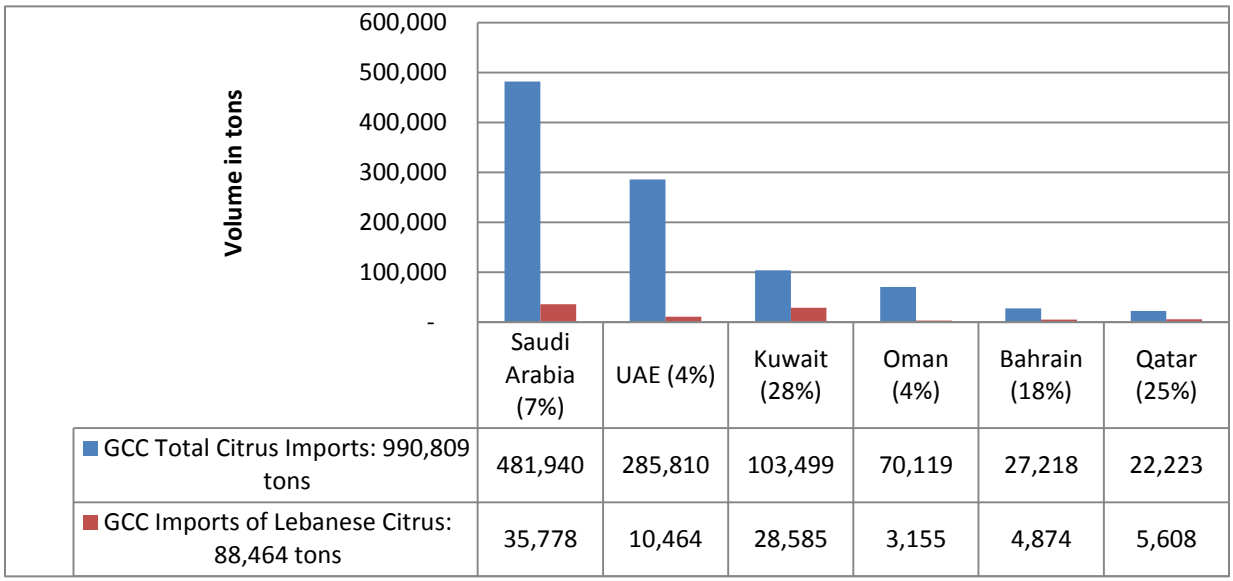
FIGURE 6: DESTINATION MARKETS FOR LEBANESE CITURS EXPORTS AS PERCENT OF VOLUME IN 2011



Source: Comtrade

Although the largest proportion of Lebanese exports flow to GCC countries, Lebanese citrus exports only claim 9 percent of the total GCC market share for citrus. In 2008, GCC's largest suppliers of citrus were South Africa and Egypt with a share value of 33 percent and 27 percent respectively, followed by Lebanon. As shown in Figure 7 below, Lebanon's total market share of GCC citrus imports is 9 percent; with notably higher market shares in a few key markets including Kuwait (28 percent), Qatar (25 percent), and Bahrain (18 percent). In general, exporters pack and export a wide variety of citrus products for exports that more or less proportionally reflect what is grown in Lebanon.

FIGURE 7: GCC CITRUS IMPORTS AND LEBANON MARKET SHARE 2011



	Saudi Arabia (7%)	UAE (4%)	Kuwait (28%)	Oman (4%)	Bahrain (18%)	Qatar (25%)
GCC Total Citrus Imports: 990,809 tons	481,940	285,810	103,499	70,119	27,218	22,223
GCC Imports of Lebanese Citrus: 88,464 tons	35,778	10,464	28,585	3,155	4,874	5,608

Source: Comtrade

Arab and GCC markets are highly suited to the current state of development of the Lebanese citrus sector, for the following reasons:

- **Lower quality requirements**: In general, Arab markets do not have strict requirements for quality and uniformity of citrus imports. This is compatible with Lebanon's small-farm production base, which does not produce large volumes of uniform fruits. Arab markets also do not have high requirements for packaging of citrus, so Lebanon's lack of consistent grading and packaging is not a major barrier to exports.
- **Relative ease of market access:** Especially compared to Europe, Arab countries have fewer restrictions and enforcement of pesticide residue levels, although in recent years these countries have begun to tighten their requirements and enforcement. The conflict in Syria has constrained Lebanese access to the Gulf, as many oranges were shipped overland through Syria, and Syrian borders were closed to Lebanese orange exporters in March 2013. It is unclear how long this border closure will last.
- **Contractual Requirements:** Most Arab countries do not depend on forward contracting. This makes them suitable to the likely situation where the amount of citrus available for export will vary markedly from year-to-year.
- **Existing export Market Linkages with these countries:** GCC countries are already the main destination for other fruit and vegetable exports from Lebanon. This implies that exporters have established relationships with importers that can more easily be expanded to include more varieties or greater quantities.
- **Cost Competitiveness:** As seen in Figure 8 below, which presents the price of citrus products in Arab markets, the prices of Lebanese exports of citrus products are cost competitive. One reason for this could be the close proximity of Lebanon to these markets, which reduces the cost of shipping compared to other exporting countries like South Africa, Chile, or Australia for example.

Large Lebanese community living and working in GCC and Saudi Arabia: The Lebanese diaspora has a distinct affinity for Lebanese products, including citrus, and is known to drive consumption of Lebanese exports in destination markets.

There is great scope for Lebanon to expand its exports to Saudi Arabia and the GCC countries simply by cutting marginally into the market shares of other suppliers. An important need is for Lebanon to assess the likely development of exports to these markets by the main regional suppliers, Egypt, Turkey, and Morocco. Individual exporters will doubtless continue to investigate markets in terms of potential and consistency with the production season. Resources should be focused on measures like grading, preparation and packaging and identifying the suitable export periods that help maximize profitability. Lebanese exporters need to acquire reliably sufficient supplies of high quality produce to allow them to make the necessary forward contracts.

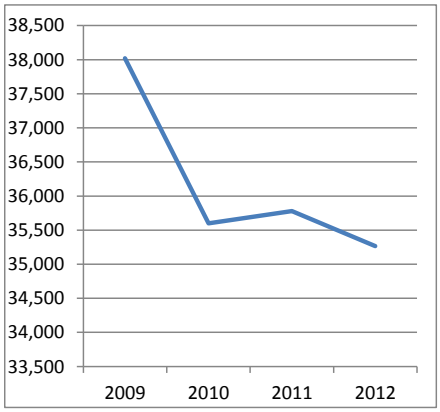
IMPACT OF THE SYRIAN CRISIS ON LEBANESE EXPORTS

With Syria providing the only overland route for Lebanese exports, businesses have faced higher transport and insurance coverage, as well as increased security risks and closures of border crossings. In addition, little has been done to expand exports by sea and air. Lebanon and its close competitor, Turkey, face the same constraint with respect to ground transportation through Syria. Demand for Lebanese agricultural products soared in Arab Gulf markets as production in war-ravaged Syria plummeted. Displacement, fuel shortages and lack of government subsidies are causing Syrian agriculture to stagnate. As Syrian competition for GCC markets recedes, Lebanese exporters are struggling to meet demand because of a significant shortage in refrigerated trucks available for hire; the Transportation and Public Works Ministry requires foreign refrigerated trucks, including Syrian vehicles, to obtain a special permit to be able to transport products from Lebanon to GCC countries. However, despite increasing GCC demand for Lebanese citrus, most of the benefits are going to traders instead of farmers who have not been impacted positively by the extra demand. Occasionally, traders take advantage of low prices to buy large quantities intended for export purposes.

KEY DESTINATION EXPORT MARKET ANALYSIS

The following sections present key characteristics and trends in the largest three destination markets for Lebanese citrus exports: Saudi Arabia, Syria, and Kuwait. A presentation of potential export markets that Lebanon could access in the future is found in Annex 1.

FIGURE 8: SAUDI ARABIA CITRUS IMPORTS FROM LEBANON 2009-2012 (TONS)



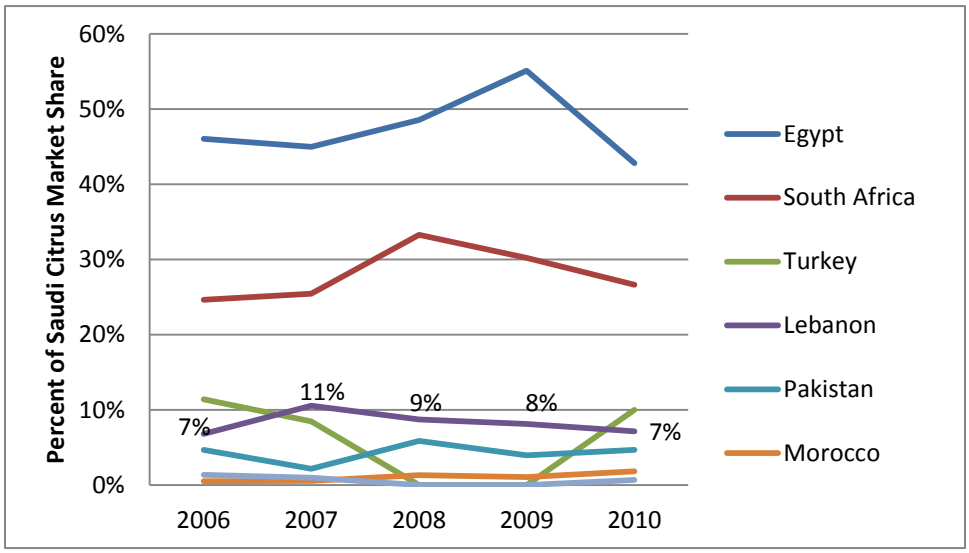
Source: Comtrade

Saudi Arabia

Saudi Arabia is currently the largest importer of Lebanese citrus. In 2012, Saudi Arabia accounted for 38 percent of all oranges exported by Lebanon as well as almost half of the total volume of Lebanese grapefruit exports, and 25 percent of Lebanese mandarin exports. Saudi Arabia imports some Lebanese lemons, but in very small quantities. As shown in Figure 9 however, the total volume of citrus imported from Lebanon declined significantly between 2009 and 2010, and have remained relatively constant at a volume of around 35 thousand tons since 2010. These losses are reflected in Figure 10 by the consistent

loss in market share recorded since 2007. Saudi Arabia also imports citrus from Egypt, South Africa, and Turkey, among other countries.

FIGURE 9: ORIGIN OF SAUDI CITRUS IMPORTS BY VOLUME

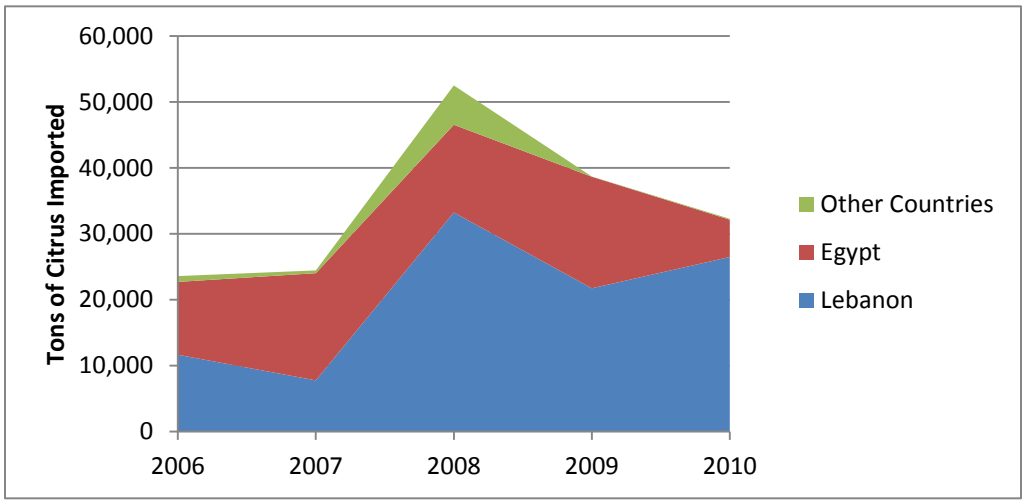


Source: Trademap. No data was reported for Turkey citrus exports to Saudi Arabia in 2008 and 2009.

Syrian Market

Syria is Lebanon's second largest importer of citrus, and in 2010, 82 percent of citrus imported by Syria came from Lebanon. Besides Lebanon, Syria's only other major trading partner for citrus is Egypt. Citrus exports from Lebanon to Syria declined significantly after the crisis in 2006, but recovered in 2008. Syrians are willing to pay higher prices for certain varieties and qualities of citrus, and Lebanese producers could modify production to meet these specifications and earn higher average prices.

FIGURE 10: TREND BY EXPORT COUNTRY OF SYRIAN CITRUS MARKET SHARE BY VOLUME



Source: Comtrade

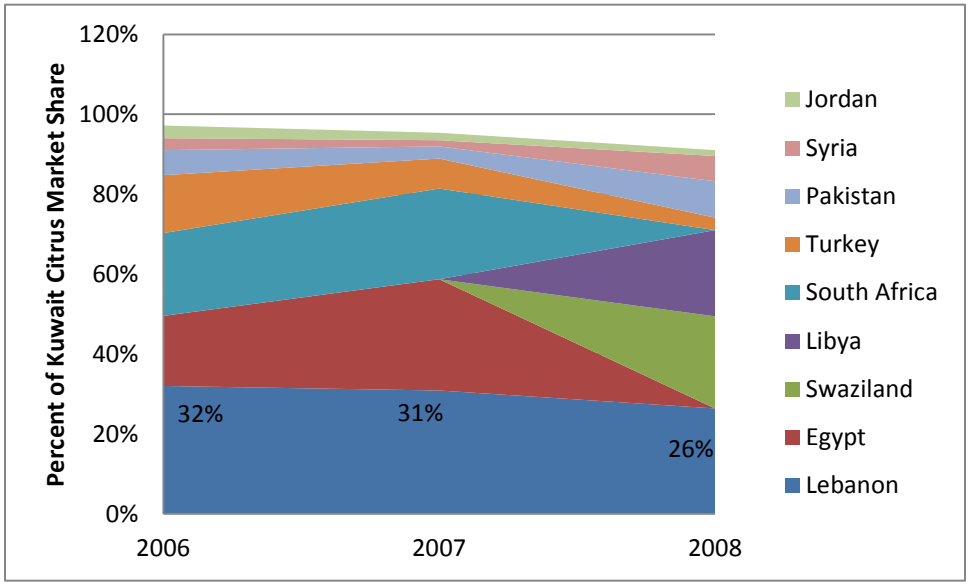
Kuwait Market

Kuwait is the third largest importer of citrus in the GCC, sourcing citrus from many of the major producers in the world. Lebanon is the largest supplier of citrus to Kuwait, followed by Egypt, South

Africa, Swaziland, and Libya. As seen in Figure 12 below however, between 2006 and 2008, Lebanon's market share of citrus exports to Kuwait registered a slow and steady decline.

With regard to competition for the Kuwaiti citrus market, South African Valencia oranges, in particular, benefit from an earlier harvest season (July-September) compared to the Lebanese Valencia oranges harvested in December. The variety's long shelf life is advantageous for South Africa. It gives South African orange exporters a leg up in setting the market price, as well as the ability to saturate the Arabian Peninsula markets even before Lebanon commences its own harvest. At the same time, Egypt ranks as one of the world's top ten orange producers and exporters. Egypt's orange exports run late November through May of the following year. Egypt's increased market share in Kuwait in 2007 was attributable to increases in total area harvested and higher production levels, as well as to improved importer confidence in Egyptian exporters honoring their commitments.

FIGURE 11: TREND BY EXPORT COUNTRY OF KUWAIT CITRUS MARKET SHARE BY VOLUME



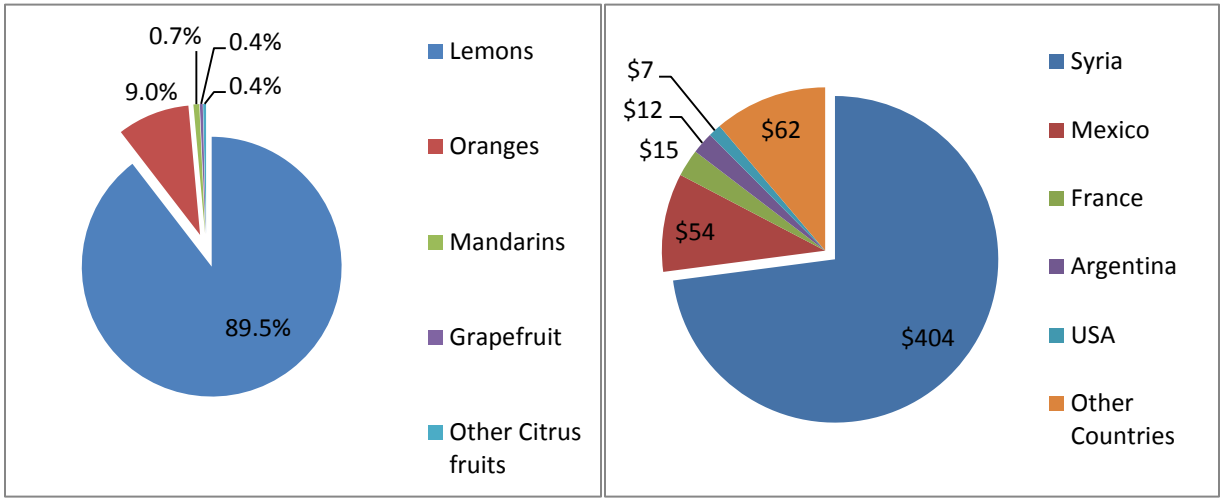
Source: Comtrade. No data was reported for Swaziland and Libya citrus exports to Kuwait in 2006 and 2007, and for South Africa and Egypt in 2008.

4. DOMESTIC MARKET ANALYSIS

Lebanon imports very small quantities of citrus, about 1,000 tons, compared to annual exports of over 120,000 tons. The import price of citrus is about three times higher than the average sale price of exported citrus, this difference in prices is mainly caused by the fact that Lebanon will import citrus only when there is a shortage in the local production or when varieties are not available (highest peaks for import are from September through December). As shown in Figure 13 below, the majority of citrus imports to Lebanon by value are lemons (nearly 90 percent). An additional 9 percent are oranges, and the remaining 1 percent is composed of mandarins, grapefruit, and other citrus products. More than 70 percent of imported citrus comes from neighboring Syria, with 10 percent originating from Mexico, and very small total values coming from France, Argentina, the USA, and other countries. Annual values and volumes of citrus imports by type of citrus product are provided in Figure 14 below. Because the average per ton

prices of citrus imports represent mixed baskets of citrus products, further import price analysis is not possible at this time.

FIGURE 12: COMPOSITION OF LEBANESE CITRUS IMPORTS BY TYPE AND ORIGIN, 2011 VALUE

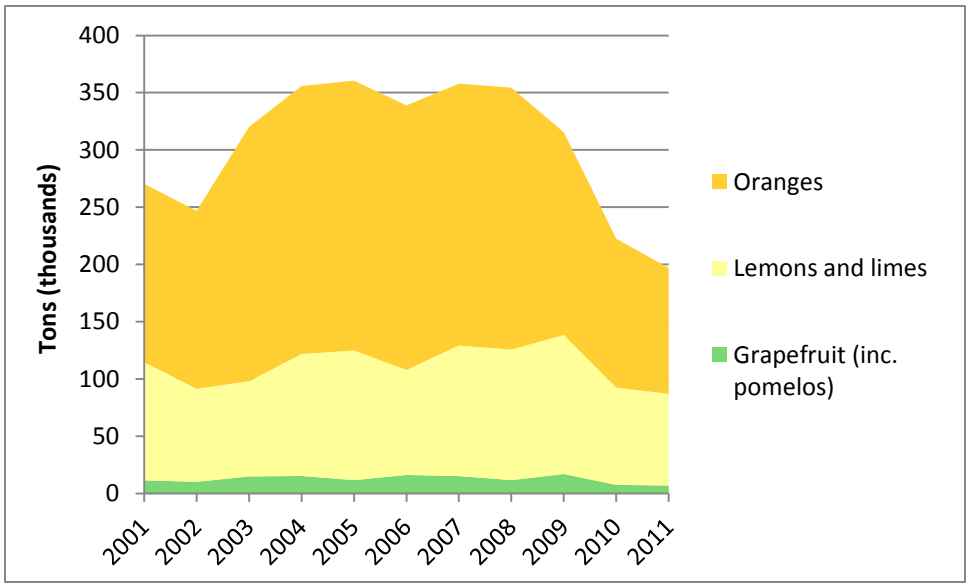


Source: Comtrade
Note: Mandarins (including tangerines and satsumas); clementines, wilkings and similar citrus hybrids; Grapefruit, including pomelos; Lemons (Citrus limon, Citrus limonum) and limes (Citrus aurantifolia, Citrus latifolia). Source: Lebanese Customs

5. PRODUCTION

According to FAOStat, total citrus production has varied significantly since 2001, and in 2011 was equivalent to just under 200,000 tons. Overall production peaked in 2004 and 2008 at approximately 360,000 tons, but declined by over 45 percent between 2008 and 2011. As seen in Figure 17 below, oranges are the largest citrus crop by volume, and much of the variability in total production can be attributed to a large increase and subsequent decline in orange production. Because they are based on the recent MOA census, LIVCD has confidence in 2010 figures reported to FAO in 2010. It is likely however that figures for orange production for years 2007 through 2009 are over-estimated, and that in reality, citrus production has been declining at a relatively steady pace since 2005. FAOStat figures below vary slightly from those recorded by the Lebanese Agriculture Research Institute (LARI), which suggest that citrus production was slightly lower in 2007. LARI data for citrus production is not available after 2007.

FIGURE 13 : PRODUCTION OF CITRUS BETWEEN 2001 AND 2011



Source: FAOStat

CITRUS VARIETIES

Most citrus varieties in Lebanon were introduced in the 1960's and have been cultivated in Lebanon for such a long time that they are now considered local varieties. The Jaffa orange, which is also called Shamouti, is the most commonly cultivated orange variety, and accounts for at least 65 percent of citrus production in Lebanon.

Shamouti/Jaffa Orange: Shamouti oranges are considered "Common Oranges". This variety was developed in the Middle East, and is known for its sweet flavor and minimal seeds. It has a deep orange peel that is "tough" and makes the Shamouti orange particularly well suited for export. Shamouti oranges are suitable for eating, not for juice production. They are in season from January to May.

Navel Oranges: "Naval" is a category of orange that includes a number of specific varieties listed below in Figure 20. Navel oranges are seedless, and have a thick, lighter orange peel. These oranges are sweet and tangy, and can be both eaten fresh or squeezed for juice. In Lebanon, Navel oranges have a slightly longer growing season, and are available from October through June.

Valencia Orange: This variety of orange is also considered a "common" orange. Valencia oranges have a more thin peel than the Navel orange, and is usually seeded. Valencia oranges can be eaten fresh, but are ideal for juicing. In Lebanon, Valencia oranges are in season from March through October, making them highly demanded through the summer when Shamouti and Navel oranges are not in season.

Blood and Succari Oranges: Although grown in much smaller quantities, Lebanese citrus producers also grow Blood Oranges and Succari Oranges. Specific varieties of these types of oranges are found in Figure 20 below. These are all grown in smaller volumes in both the North and the South.

FIGURE 14 : MOST IMPORTANT ORANGE VARIETIES IN LEBANON

Type/Species	Specific Varieties
Navel Oranges	Washington Navel, Navel Late, Navalina, Thompson Navel, Lane Late, New Hall
Common Oranges	**Jaffa Shamounti,** Hamlin, Valencia Late, **Valencia** Late Olindia
Blood Oranges	Cara, Washington Sanguine, Rub, Tarocco, Double Fine, Sanguinelle
Succari Oranges	Succari Maghrabi, Tangelo Minneola, Fortune

Source: LARI, Lebanon, 2010

Lebanese farmers produce three main Lemon varieties, Interdonato, Monachello, and Meyer. These varieties have slightly different qualities and flavors, especially Meyer Lemons, which are especially sweet and fragrant. These varieties are also characterized by their resistance to Mal secco and gummosis diseases which can have negative impacts on production of other lemon varieties. Other varieties that can be found in Lebanon, though in low quantities, are Palestine lime, Mexican lime, Lemon Four Season, and Femminello. Most lemons are produced in the caza of Sidon.

Other important citrus varieties cultivated in Lebanon are Mandarin, Clementine, and Tangerine, which are grown mostly in Batroun with a small amount in Sidon. Figure 21 below presents the most common varieties of these types of citrus. Production of grapefruit and pomelo are particularly low, as they are relatively new, and there is limited demand for these fruits. A few Lebanese producers have also started producing Kumquats, which are considered "fancy," and not widely popular in domestic markets.

FIGURE 15: MOST IMPORTANT NON-ORANGE SPECIES AND VARIETIES IN LEBANON

Type/Species	Specific Varieties
Mandarin	Satsuma Owari,Satsuma mandarin, Temple, Avana
Clementine	Nour, Fina, Fedele, Common, Hernandina
Tangerine	Mediterranean Mandarin, Ortanique Tangor, Commune
Grapefruit	March Seedless, Thompson Pink Marsh, Star Ruby, Red Blush, Ruby Red,
Pomelo	Shaddock

Source: LARI, Lebanon, 2010

Most citrus rootstock is of the Sour orange. This orange is used in small quantities for artisanal purposes, such as extracting essence of orange blossom. The Sour range rootstock, however,

is desirable for its resistance to soil borne diseases, and farmers typically graft other types of citrus fruits (such as other varieties of orange or other citrus species such as lemon or grapefruit) onto Sour Orange rootstock. . Other relatively common rootstocks are the Volkameriana, Macrophylla and hybrid rootstocks such *Poncirus trifoliata*, Carrizo citrange, Troyer citrange that were introduced due to their resistance to Tristeza and/or to Gummosis Diseases.

Typically, farmers choose which species and variety of citrus fruit to grow in a relatively passive way. Some farmers will graft new types of citrus fruits such as clementines or lemons onto older citrus trunks. Small-scale farmers decide what to graft, or what new trees to plant largely based on what their neighbors are doing, grafting material availability, and any available market clues. As seen in overall production volume, there has been a dramatic decline in orange production since 2008, largely because farmers in the

South are replacing citrus groves with avocado and banana. Banana and avocado cultivation is not an option for farmers in the North because it is too cold.

PRODUCTION PRACTICES

The cropping system for citrus production in Lebanon reflects mostly older, traditional practices that are no longer considered best practice by international standards. Typical citrus farming practices, described below, support average annual yields of 3 tons per dunum, compared to annual yields using best practices which can be as high as 5 tons per dunum.

In Lebanon, trees are planted at a distance of four to six meters apart for a planting density of between 30 and 50 trees per dunum. Most citrus orchards are mixed with three to six different varieties ranging from Navel to Shamouti, Pomelo, Mandarine, and Valencia. It is common for Lebanese farmers tend to practice vegetable intercropping especially during the first years of orchard establishment for better land use and income. Some orchards are mixed with banana especially in the south.

All citrus plantations in Lebanon are irrigated; the majority using traditional furrow or flood systems, and a smaller portion using drip irrigation systems. Despite the fact that drip irrigation is now considered a best practice for citrus production internationally, many farmers believe that drip irrigation will not provide enough water for a big tree that has traditionally been irrigated by flooding. It is likely that farmers made this conclusion after experimenting with poorly designed drip irrigation systems that did not adequately water the trees.

Pruning is conducted once a year, and spraying is made five to seven times per year using a small tank with three cubic meters that has a three to four sprayer lances connected to it. Unfortunately, safety precautions are rarely followed, including allowing appropriate time for harvesting after spraying. Fertilization is usually done three times per year, generally by spreading manually: first an application of nitrogen is made in mid-spring during flowering, followed by potassium salt in mid-production to hold the flowering, finally phosphorus fertilizer is applied before harvesting.

At the farm level, modifications of farmer practices could dramatically improve productivity and quality of oranges produced. For example, improving of pruning practices and use of drip irrigation systems and drip-irrigation delivered fertilization could improve efficiency and yields. Additionally, improved integrated pest management (IPM) could reduce the need for pesticide spraying and improve quality and reduce the cost of pesticide.

HARVESTING PRACTICES

Harvesting practices utilized by Lebanese producers are adequate, although there is room for improvement in harvesting infrastructure including using ladders. Currently, harvesting is exclusively done by hand picking- there is no machinery used in the harvesting process except transportation from the field to the collection point, and then to the packing house. Fruits are harvested using a hand clipper or a hand clipper with a long stick to reach the higher placed fruits; a ladder is also used to reach hard to reach fruits, however the kind of ladder used in Lebanon is not appropriate, and usually it is placed directly against the tree damaging the new shoots. Fruits are then placed in plastic crates weighing about 20 kg each.

Permanent workers and daily laborers are usually hired for harvesting; citrus is harvested gradually, since the fruits can stay on the tree for an average of three months without deteriorating in quality.

POST-HARVEST PRACTICES

While citrus is on the tree it can maintain quality for up to three months, however once it is picked it becomes perishable and can only be stored with cold storage, which is not readily available for citrus in Lebanon. Post-harvest losses in the Lebanese citrus sector are typically between five and 15 percent. These losses are caused by inadequate and inefficient packinghouses, mechanical damage due to inappropriate packaging, and lack of sanitation.

Farmers who sell fruits to the domestic market bring citrus to wholesale markets on a regular basis. During peak season, this can be a few times a week or every day during peak season. Sorting and packaging of citrus fruits destined for the local market is usually done only to eliminate fruits with serious defects or decay. This can be accompanied by some basic grading based on appearance such as size, color, and defects. Post-harvest treatments such as cleaning, sorting, grading, and waxing are applied only to fruits intended for export. This is largely because pack houses do not have the capacity to process more citrus fruits, and because it is unclear if domestic markets would support the added cost of these services. Lebanese citrus is transported from the farm gate to pack houses and wholesale markets in plastic crates and other ad-hoc transport containers. One common problem in Lebanon is that many of the containers used do not provide adequate protection for the fruits, leading to crushing and puncturing of the citrus skin.

Once at the pack house, citrus fruits have different storage requirements. Figure 22 below presents the range of temperature, relative humidity, and storage periods for the main types of citrus fruits produced. Many Lebanese pack houses that process citrus lack the capacity to moderate humidity and temperature in a precise way.

TABLE 1: RECOMMENDED STORAGE CONDITIONS FOR DIFFERENT CITRUS FRUIT

Storage Conditions	Orange	Lemon	Grapefruit	Mandarin
Temperature	4-8°C	12-14°C	12-14°C	5-8°C
Relative Humidity	88-90%	88-90%	88-90%	88-90%
Storage period	8-12 Weeks	16-24 Weeks	4-6 Weeks	3-5 Weeks

Source: LARI

MARKETING

The vast majority of citrus production is sold through wholesale markets in Saudi, Beirut, and Tripoli as well as other smaller wholesale markets. As there is only one wholesale market in each major city, farmers do not have many sales options and negotiation power is skewed to the side of the wholesale traders, who routinely pressure farmers to accept low prices and slim margins. Traders charge on average a 12 percent margin on sales.

In general, the highest quality oranges are consumed in domestic markets, and middle-quality oranges are exported. Whereas in many orange producing countries, the lowest quality oranges are sold to orange juice producers, in Lebanon there is only one orange juice company that does not require high volumes of oranges. Thus, farmers are not earning revenues from a significant portion of production. Exact ratios of high to medium to low quality oranges produced vary widely between regions and producers, and were not available for this assessment.

6. CONSTRAINTS

Citrus farmers face a myriad of constraints, many of which are common in other agricultural sectors. The most pressing constraints include the relatively high cost of production, absence of reliable extension services, and difficulties in marketing produce. Key constraints to the citrus value chain are presented below:

LOW PROFITABILITY AT THE FARM LEVEL

Low profitability is caused in part due to relatively high costs of production. The small plot size of many farmers, especially those in the south, limits the potential for economies of scale. Farmers are not organized in any kind of cooperative that could enable bulk purchasing and result in cost savings on key agricultural inputs such as fertilizers and pesticides. Instead, farmers purchase these products in small quantities at higher per-unit prices. The high cost of agricultural inputs could be one of the reasons that citrus farmers in the North of Lebanon typically under-invest in fertilizers and pesticides.

Low profitability is also caused by low yields, which have been declining for multiple reasons. First, Lebanese citrus farmers suffer from widespread disease and pests, especially in the North where farmers under-invest in pesticides. IPM is not widely adopted among citrus growers. Yields are also declining due to the perseverance of traditional production practices that are no longer considered best practice for citrus production such as flood and furrow irrigation, harvesting practices that damage the tree, and low plant density. Second, farmers have very limited access to technical extension services that could increase knowledge

Finally, the market for lower-grade oranges is exceptionally small, as there is only one orange juice processing factory in Lebanon that uses predominantly imported orange concentrate. This juice factory,

located in Tyre, has a negative reputation for using non-competitive purchasing practices when it sources oranges from the domestic market. Without a viable, competitive end market for lower quality oranges, farmers are not able to recoup some of the costs of producing these lower quality oranges.

LIMITED ACCESS TO COLD STORAGE FACILITIES AND HIGH POST-HARVEST LOSSES

As seen in Figure 22 above, cold storage has the potential to greatly extend the shelf life of citrus products. Despite this potential, only about half of Lebanese citrus production, the portion that is destined for international markets, passes through cold storage. Most of these fruits for export are purchased from wholesale markets, packed, and put into the exporter's private cold storage facilities until they are exported. Other than these private storage facilities owned by exporters, other citrus value chain stakeholders have limited access to cold storage, even at wholesale markets. This lack of access to cold storage is the main driver of post-harvest loss rates of as high as 15 percent for a product that has the potential to have relatively long shelf life.

LACK OF CAPACITY TO MEET INTERNATIONAL PRODUCT SPECIFICATIONS

As presented above, producers in the Lebanese citrus value chain do not utilize "best practices" for citrus production, which can lead to lower yields as well as smaller, lower quality fruits. Poor production practices are a product of limited technical extension services available to farmers. Farmers also lack access to any centralized market information system that could transmit information about target export market product specifications and other aspects of demand such as varieties, seasonality, and prices. Without this type of market intelligence service, farmers have no way to inform their planting decisions, and are left copying decisions made by farmers in their region or taking ad hoc advice from input suppliers and wholesalers that may not be based in any real information either. Regardless of production practices, post-harvest practices, including sorting, grading, waxing, and packing all fall short of international standards.

The prevalence of international, vertically integrated companies that achieve large efficiencies of scale and produce citrus according to best international practices also creates a constraint for small scale Lebanese producers, as they cannot compete with these companies in international markets. Additionally, it is common for other smaller-scale citrus producing countries to provide subsidies to promote exports, provide cheaper agricultural inputs to farmers, and develop required cold storage infrastructure.

POOR REGULATORY ENABLING ENVIRONMENT

The citrus industry in Lebanon lacks both institutional organizations to advocate on its behalf, as well as a legal framework to control pests and diseases and promote quality and traceability throughout the sector. For example, citrus farmers do not have cooperatives or a syndicate that is active on a regional or national level. Other value chains have syndicates and cooperatives that have played meaningful roles in attracting donor funding for infrastructure upgrades, advocating on behalf of producers to the Ministry of Agriculture, and facilitating dissemination of market information and technical assistance.

The legal and institutional environment for citrus in Lebanon is largely under-developed. For example, Lebanon currently does not have citrus pest and disease quarantine to control imported fruits and plants coming in to Lebanon to ensure that they are not contaminated and threatening to domestic crops. Although the Ministry of Agriculture has been working in recent years to draft and formalize quarantine regulations for citrus and other agricultural crops, the status of such regulation is unclear at this point. Additionally, once the regulations are agreed upon, it is unclear to what extent the Ministry of Agriculture and other institutions will be able to implement quarantine controls. Citrus nurseries are also unregulated,

and there are limited standards regarding the quality and growing standards of tree seedlings and grafting materials. Many nurseries are not specialized in citrus seedling production, and produce multiple plant species without specialized treatments to improve the quality of seedlings, without certificate of variety, and without quality control, leading to low quality seedlings. Finally, the citrus industry does not have any regulation related to pesticide regulation or pest management beyond a list of banned pesticides that was established by the Ministry of Agriculture in 2010. This list does not include many dangerous pesticides that are banned in other countries. The prevalence of these banned substances could lead to residues on fruits that fall short of export requirements in regards to environmental standards especially in European markets, and could lead to negative health and reputational consequences.

7. POTENTIAL INTERVENTIONS

Currently, the Lebanese citrus sector is in decline. This is due to low profitability, the prevalence of relatively poor production practices, poor extension services, and the likely re-emergence of Egypt as a highly competitive citrus exporter which will return citrus prices in the Middle East to normal levels. Within this context, efforts to reinvigorate the citrus sector may face challenges gaining traction with farmers, who are increasingly more interested in other crops.

If the LIVCD project works in the citrus value chain however, there are a few key interventions that could have some positive impacts. These possible interventions are described in more depth below:

1. IMPROVE MARKET INTELLIGENCE AND CAPACITY FOR STRATEGIC DECISION MAKING FOR ADOPTING NEW VARIETIES AND TIMING OF HARVEST. LIVCD can train key citrus value chain stakeholders on collecting and analyzing key market information for domestic and target citrus export markets. As farmers have greater access to market information related to seasonality, varieties demanded, price elasticity, and key product specifications, farmers will be empowered to make better strategic decisions that will result in improved prices for their products.

2. IMPROVE PRODUCTION PRACTICES TO INCREASE YIELDS AND QUALITY. As presented above, there are opportunities to improve technical production practices in the citrus value chain. This includes improving irrigation practices, application of fertilizers and pesticides, and timing and traditional harvesting. Key to implementing this intervention will be facilitating improved extension services through the public or private sector to provide trainings and demonstrations of best practices. LIVCD can also promote intercropping of citrus orchards with other crops such as pomegranate, timber, or other crops (See Annex 4).

3. EXPAND POST-HARVEST INFRASTRUCTURE AND PRACTICES TO REDUCE POST-HARVEST LOSS RATE. Expansion of cold storage can dramatically improve shelf life and quality of citrus fruits. LIVCD can work with key value chain stakeholders to create an investment plan that stakeholders can use as the basis of a proposal to the appropriate government institution. Upgrading of cold storage facilities will be an integral component of other value chain interventions so LIVCD can look for opportunities to link citrus farmers to other upgrading programs as relevant.

4. STRENGTHEN CITRUS ENABLING ENVIRONMENT, PARTICULARLY PRODUCER ORGANIZATIONS AND EXTENSION SERVICES. LIVCD can work with citrus producers to create a focal point for delivery of technical extension, market information

services, and production aggregation. This could include a citrus growers association, or expansion of a citrus or mixed tree fruit cooperative. Additionally, LIVCD can create advocacy plans to strengthen their ability to influence the Ministry of Agriculture to establish appropriate quarantine and other types of regulation for the citrus industry.

5. EXPAND END-MARKET OPTIONS FOR LOWER QUALITY ORANGES: Currently, because there is only one juice processing facility in Lebanon, farmers have very limited end markets for lower quality orange production. LIVCD can support a feasibility study of orange and other fruit juice facilities to evaluate potential profitability and positive impact of such a facility through the citrus value chain.

ANNEX 1: MAJOR WORLD CITRUS IMPORTERS NOT CURRENTLY ACCESSED BY LEBANON

Although Lebanon currently exports to Arab markets, there are a number of non-Arab countries that Lebanon could target to expand exports. A few of these markets are described below.

The Russian Federation: The Russian Federation is the world's largest importer of citrus, and maintains a total market share of 11 percent of the total exported volume of citrus. Major suppliers of citrus for the Russian Federation are Turkey (23percent: mandarins, lemons, and grapefruit), Morocco (16percent: mandarins and oranges), and Egypt (13 percent: oranges), South Africa (oranges), and China (mandarins and grapefruit). These major players have several advantages in the Russian market. First, they qualify for preferential import duties under the Customs Union Commission Decision #130 which approved the list of products enjoying tariff preferences, and lists of the developing and the least developed countries, users of preferences. The customs duty for products with preference is 75 percent of regular duty calculated in US Dollars or Euros. Second, Turkey, whose citrus exports to Russia get stronger every year, is improving its competitive advantage by improving quality and packaging, expanding their supply season, and putting out promotional commercials on Russian TV. Third, in the case of Morocco, in 2010, Maersk Line opened a direct line called the MARUS Express connecting Russia and Morocco. Now transit time between the two countries is 8-10 days. This regular and shorter shipment routing eases the logistics for Moroccan citrus and makes the product more competitive on the Russian market.

Given that Russia is a vast country stretching for 12,000 km from East to West and spanning nine time zones, the food market in Western Russia differs significantly from the Pacific coast market. The Port of St. Petersburg is the major trade route handling around 75 percent of fruits arriving in Russia. Most consumption is concentrated in the Western and Central Russian market, with approximately 120 million people in the territory reaching from the Western border stretching to the Ural Mountains. The Novorosiisk Port on the Black Sea receives more Egyptian and Turkish fruits and plays an increasing role in fresh produce supply to the Southern regions of Russia. Citrus from Turkey, Morocco, Egypt, and South America dominate in Western Russia markets.

Other Major World Citrus Importers: The EU is a net importer of oranges, with imports exceeding exports by a large margin. Imports into the EU were valued at about $611 million in MY 2011/12 whereas the value of exports in MY 2011/12 was close to $230 million. Intra-EU trade is very important, considering the volume of oranges produced within the EU; EU orange production is concentrated in the Mediterranean region. Oranges are the second largest EU fruit crop after apples, with more than 80 percent of the EU's total production of oranges sourced from Spain and Italy. The remaining 20 percent is distributed among other Member States, mainly Cyprus, Greece and Portugal. The main customers of the major EU producing countries are other EU Member States.

Germany, the Netherlands, and France all maintain a seven percent market share of world citrus exports. Both Germany's and France's major supplier with a dominant market share is Spain (77 percent in Germany, and 75 percent in France), while the market share for Netherlands is equally divided between Spain (24 percent) and South Africa (24 percent). At the same time, the world's fifth largest importer of citrus, the UK, also gets its citrus from Spain (39 percent) and South Africa (18 percent); South Africa supplies the EU market from June until October, when the Northern hemisphere harvest starts, followed by Egypt, Morocco, and Tunisia.

The U.S. citrus market is mostly supplied by Mexico with about 63 percent of the total imported citrus.

The table below shows the average price paid by the world's major citrus importers in 2011, and comparatively when possible, the price paid for Lebanese citrus:

TABLE 2: AVERAGE PRICE PAID BY THE WORLD'S MAJOR CITRUS IMPORTERS IN 2011

Major Importers	Average Price per kg of citrus	Price per kg paid to top three suppliers		
Russian Federation	$0.95	Turkey: $0.92	Morocco: $0.95	Egypt: $0.85
Germany	$1.01	Spain: $0.99	Italy: $0.97	South Africa: $1.02
Netherlands	$0.92	Spain: $0.94	South Africa: $0.87	Argentina: $0.88
France	$1.05	Spain: $1.05	Morocco: $1.02	South Africa: $0.90
UK	$0.99	Spain: $1.08	South Africa $0.94	Morocco: $0.89
USA	$0.93	Mexico: $0.59	Chile: $1.13	Spain: $2.28
Saudi Arabia	$0.68	Egypt: $0.68	South Africa: $0.76	Turkey: $0.77
Poland	$0.80	Spain: $0.78	Turkey: $0.79	Italy: $0.61
Canada	$0.98	USA: $0.87	Morocco: $1.77	South Africa: $1.05
Ukraine	$0.64	Turkey: $0.62	Egypt: $0.57	Spain: $0.82
Italy	$0.93	Spain: $0.87	Argentina: $0.93	South Africa: $0.90
Japan	$0.93	USA: $1.23	South Africa: $0.96	Australia: $1.25

Source: Trademap

LEBANON'S ACCESS TO NON-ARAB MARKETS

It is very difficult for Lebanese citrus exports to compete effectively in western European markets due to the EU's restrictive entry price system, Lebanon's lack of capacity in assembling large consignments of high uniform quality product demanded by the agents of large supermarket chains, and inability of guaranteeing a regular annual supply. The alternative of selling through an agent at a wholesale market would mean targeting the low-priced end of the market. Given the cost of shipping, this option would unlikely be as profitable as selling into the Arab market, and it would also involve price uncertainty. Any export opportunities that do arise in Western Europe would likely be the result of Lebanese exporters exploiting small windows of opportunity that arise due to the Lebanese harvest being slightly ahead of harvests in citrus-producing EU member countries. Relative to Western Europe, there is more potential for Lebanese traders to export to Eastern Europe and the Russian Federation, because the quality and consistency requirements are lower. However, for Lebanon, these markets lack the transport cost advantages of the Arab countries. Exports to this region are likely to remain opportunistic and, compared with regular shipments to the Gulf, relatively infrequent.

CONSTRAINTS WITH THE SORTING-PACKING FACILITY AND OPPORTUNITY FOR LIVCD TO ASSIST

What is needed:

Additional equipment;

A small building to adjust the flow of product, and to raise efficiency;

Installation of a new sorting line for citrus;

Building of a mezzanine level for stocking empty packing materials.

Equipment for washing containers (Crates) after each harvest.

Installation of a rack needed to enlarge the capacity of the existing refrigeration unit.

Establishment of a fresh citrus juice processing facility: after grading, there are large quantities of citrus that are not marketable and that can be used for juice making. Safadi has the space, and some farmers are ready to partner and invest to establish this facility.

This pilot experience may be developed and replicated in different production areas. Additional service may be added to encourage collective purchase of services, inputs, as well as collective post harvesting and marketing strategies. The service center may become a reference and an aggregator for farmers to cooperate as well as to advocate for their rights and needs.

ANNEX 3: SCREENING WITH LIVCD VALUE CHAIN SELECTION CRITERIA

Competitiveness

12. **Exports in 2010:** Lebanon exported US$ 16.6 million of citrus in 2010.

3. **Imports in 2010**: Lebanon imported US$ 0.74 million of citrus in 2010.

4. **Potential to capture added value**: Medium: The value of citrus could increase by 30-40%.. Fresh juices also provide an opportunity to capture added value, as juice processing uses smaller fruits that are less suitable for eating. Fresh citrus juice is in high demand in the GCC, however air transport adds significant costs. Packaged fresh juice will compete with brands such as the U.S. brand Tropicana.

5. **Potential to differentiate and types of differentiation**: Medium: Value can be added in export markets, through better homogeneity, sorting, and certification that produces is free of pesticide residues. Domestic market differentiation can be derived from improved orchard planning to widen production windows and thus increase the window of product availability in the market. The seasonality of Lebanese citrus corresponds to European production, making the EU market highly cost competitive.